Advanced Simulation Capability for Environmental Management (ASCEM)

Independent Peer Review and Assessment

Team Report

Technology Innovation and Development
Office of Environmental Management
U.S. Department of Energy

September 15, 2010

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Transmission Memorandum

Date: 15 September 2010

To: Yvette T. Collazo, Director
Office of Technology Development and Innovation (EM-30)
Office of Environmental Management
US Department of Energy

Re: Independent Peer Review and Assessment (IPRA) of
Advanced Simulation Capability for Environmental Management (ASCEM)

The first IPRA Team was assembled and executed an ASCEM review in accordance with the approved Charter dated July 8, 2010. The preliminary subject of review was the FY10-FY15 Integrated Modeling Implementation Plan.

Based on the written information provided to the IPRA Team and particularly as supplemented by discussions with program managers and staff, it appears that the design of ASCEM is well conceived, reasonable and consistent with relevant scientific principles. An integrated, flexible and modular modeling framework has the potential to enhance knowledge integration, site characterization, and understanding of contaminant fate and transport processes; this can lead to dramatic improvements in management of DOE-EM sites, reduction of risk, and cost savings.

At the same time, prediction and management of the multimedia environment are common to many significant problems in energy, environment, and water resources, and hence transcends EM and applies to other DOE offices and even beyond DOE. The complexities and challenges of ASCEM seem to be understood and efforts have been made to gain support and feedback from those who would use this approach.

The IPRA Team recommends that periodic independent peer review and assessment be conducted to: (1) ensure application of appropriate metrics to demonstrate capability and value to EM's current and future needs; (2) determine whether the appropriate interfaces and services are being developed; and (3) enable funding sustainability.

Process details, findings, and observations are attached.

Albert J. Valocchi, Ph.D
IPRA Team Lead

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Independent Peer Review and Assessment
Advanced Simulation Capability for Environmental Management

ASCEM IPRA TEAM

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IPRA Coordinator

September 15, 2010

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Findings and Observations

Based on the written information provided to the IPRA Team and particularly as supplemented by discussions with program managers and staff, it appears that the design of ASCEM is well conceived, reasonable and consistent with relevant scientific principles. An integrated, flexible and modular modeling framework has the potential to enhance knowledge integration, site characterization, and understanding of contaminant fate and transport processes; this can lead to dramatic improvements in management of DOE-EM sites, reduction of risk, and cost savings. At the same time, prediction and management of the multimedia environment are common to many significant problems in energy, environment, and water resources, and hence transcends EM and applies to other DOE offices and even beyond DOE. The complexities and challenges of ASCEM seem to be understood and efforts have been made to gain support and feedback from those who would use this approach. Ultimately, transparency and quality in model-supported decision-making are the key goals.

The ASCEM IPRA Team provides the following findings and observations:

- The technological design defined by the ASCEM initiative appears measured, flexible, and is appropriate for its stated goals. Although the presented ASCEM FY10-FY15 Integrated Modeling Implementation Plan appears to be sound, the implementation of the plan requires significant attention to existing information; available software; and scientific and technical developments and advancements. To ensure that ASCEM proceeds consistent with DOE needs, compliance with scientific and technical requirements, and other relevant parameters, it is desirable to conduct periodic independent peer reviews.
- The main objective statement should consider using the descriptive term “multimedia”, and reconsider its current focus on subsurface modeling (e.g., change “multi-phase, multi-component, multiscale subsurface flow and contaminant transport” to “multimedia, multi-phase, multi-component, multiscale flow and contaminant transport”).
- The long-term success in science integration may depend on the degree that modelers are incentivized to use a common infrastructure. EM should ensure that recognitions and rewards promote the team oriented work needed to promote successful integration.
- It appears that several organizations within DOE will be included as an oversight committee as they are involved in the development and implementation of models that are comparable or supplementary to those being considered in the ASCEM initiative. It is desirable to ensure that information from relevant programs and experience from earlier and ongoing NNSA efforts at peta-scale computing continue to be included during planning and implementation of ASCEM.
- To ensure that success is measurable, indicators/metrics need to be developed and applied to the process and these should be subject to independent peer review.
- The subject covered by ASCEM is multifaceted, complex, and multidisciplinary. Several agencies of the US government, many members of academia, and various industries are involved in development and application of software relevant to ASCEM. While there has been a survey of end users within DOE-EM, it is highly desirable to convene periodic

exchange workshops open to the public. There are plans for a separate oversight committee having interest in an integrated approach that can be applied to problems outside EM. It is also desirable to supplement this information exchange with interaction with other groups involved in related activities (e.g., Interagency Steering Committee for Multimedia Environmental Modeling (ISCMEM)).

- ASCEM should provide for key on-site "API-technologist" [application programming interface] support at each major participating lab. This will be critical in ensuring that members of the core-API development staff, covering Platform and HPC [high performance computing] thrusts, will be available on-site and in close working relationships with modelers to assist in their integration efforts to bring models and data into the framework (i.e., once the framework is available and is in place for use).
- Recognizing the profound significance of cleanup of contaminated sites and the need for modeling the movement of contaminants, training courses should not be limited to DOE, but should include academia, industry, and other governmental agencies. These groups should be engaged as early as possible to help provide insight to make the platform more useful. Consideration should be given to expanding accessibility to individuals from other countries.
- The implementation plan appears to facilitate contemporary HPC-driven solutions for integrated modeling in the context of "massively parallel" subsurface modeling. It also appears to allow for integration of legacy models. Legacy model and tool wrapping are as important, appear to also be supported, and will remain beneficial to conducting comparative analysis and ensuring overall quality assurance (e.g., uncertainty analysis, sensitivity analysis, and parameter estimation [UA/SA/PE]).
- Appropriate funding is required to achieve accelerated development of model evaluation tools within the Platform thrust. A broader range of sensitivity analysis techniques along with a full suite of inverse problem formulation capabilities should be emphasized early. Piecemeal, extended assimilation of key data acquisition and model evaluation tools needed to reach "critical mass" of effectiveness and utility of services provided to EM modeling staff should be avoided.
- Expanded multi-language support should be provided to the degree feasible to better support all user community needs for the Platform thrust (e.g., models and UA/SA/PE tools; i.e., providing bindings for JAVA, Python, dotNet, other variant commercial versions of C++, FORTRAN, etc.). In other words, bring the technology to the modelers.
- The critical needs of documentation of the API set, along with sufficient examples and applications, should not be underestimated in their importance in meeting successful integration goals stated for the DOE's EM complex.
- In order to gain regulatory acceptance of ASCEM-derived performance assessments, it must successfully integrate disparate data and models with advances in model evaluation science (i.e., UA/SA/PE), and peta-scale HPC. Success is contingent upon achievement of high levels of quality-assurance throughout this integration effort (i.e., through verification, validation, documentation, independent peer review efforts, etc).

Appendix 1: AGENDA

Independent Peer Review and Assessment
Advanced Simulation Capability for Environmental Management

" This Independent Peer Review and Assessment of the Advanced Simulation Capability for Environmental Management addresses the FY 10-15 Integrated Modeling Implementation Plan, in accordance with Lines of Inquiry in the ASCEM IPRA Charter "

Date/Location: September 8-10, 2010
Project Enhancement Corporation
20300 Century Blvd., Suite 175, Germantown, MD 20874

Presentation and Discussion:

- **Dr. Mark Williamson, (301) 903-8427; Mark.Williamson@em.doe.gov**
- **Dr. Paul Dixon, (505) 667-3644; P_Dixon@lanl.gov**
- **Dr. Russell Patterson, (575) 234-7457; Russ.Patterson@wipp.ws**
- **Dr. David Moulton, (505) 665-4712; moulton@lanl.gov**
- **Dr. Justin E. Babendreier, (706) 355-8344; babendreier.justin@epa.gov**
- **Dr. A. Alan Moghissi, (703) 765-3546; moghissi@nars.org**
- **Dr. Albert J. Valocchi (Lead), (217) 333-3176 valocchi@illinois.edu**
- **Dr. Ralph O. Allen, (434) 982-4922; ralph@virginia.edu**
- **Dr. Aníbal L. Taboas, (630) 287-0026; TaboasA2@ASME.org**

Technical Editor: Christina Swanson, (240) 686-3059; CSwanson@pec1.net

Documents provided:

- **Charter for the ASCEM Initiative**
- **Scientific Opportunities to Reduce Risk in Groundwater and Soil Remediation**
- **National Academy of Science advice on Department of Energy Cleanup Technology Roadmap**
- **Charter for Independent Peer Review and Assessment of ASCEM**
- **FY 2010 ASCEM Initiative Implementation Plan**
- **FY 10-15 Integrated Modeling Implementation Plan**

Follow-on discussion and report preparation:

Issue final report by September 15, 2010

Appendix 2: BIOGRAPHICAL INFORMATION

Dr. Ralph O. Allen, (434) 982-4922; ralph@virginia.edu.

Professor Allen is Associate Vice President for Research, Director of Office of Environmental Health and Safety, Professor of Chemistry and Public Health Sciences, Radiation Safety Officer at the University of Virginia. He holds a PhD in Chemistry (University of Wisconsin), and has performed studies in the migration of trace elements in geological systems.

Dr. Allen authored over one hundred publications on lunar and meteoritic analysis, application of nuclear analytical techniques to archaeology, trace elements in cancer, radiation effects, analytical chemistry and forensic science. Awarded fellowships for research in Norway by Royal Norwegian Council for Scientific and Industrial Research (1977) and Norwegian Marshall Fund (1983). Awarded Erikson Award by Federal Bureau of Investigation for service to the forensic science community. He has been a tour speaker for the American Chemical Society since 1984 and has served as a consultant for the International Atomic Energy Agency on radioactive waste disposal methods. He directed the decommissioning of two nuclear research reactors at the University of Virginia.

Dr. Justin E. Babendreier, (706) 355-8344; babendreier.justin@epa.gov

Dr. Justin E. Babendreier is an Environmental Engineer with the U.S. Environmental Protection Agency, Office of Research and Development, National Exposure Research Laboratory. He holds a PhD in Civil Engineering (Virginia Tech) with background degrees in Mathematics and Electrical Engineering and is a registered Professional Engineer. His research areas are currently directed in multimedia assessment strategies and integrated modeling systems focused on multimedia exposure and risk assessment of hazardous contaminant releases with emphasis in model evaluation science. His investigations include probabilistic integrated multimedia modeling, Windows/Linux-based supercomputing approaches, and development of software technologies covering a wide range of uncertainty analysis, sensitivity analysis, and parameter estimation (UA/SA/PE) techniques.

Dr. A. Alan Moghissi, (703) 765-3546; moghissi@nars.org

Dr. A. Alan Moghissi is President of the Institute for Regulatory Science (RSI), a non-profit organization dedicated to the principle that societal decisions must be based on best available scientific information (BAS) including Metrics for Evaluation of Scientific Claims (MESC). He is also a Senior Fellow and Member of the Board of Regents at the Potomac Institute for Policy Studies in Arlington, Virginia. He holds a PhD in Physical Chemistry (Karlsruhe Institute of Technology). At the U.S. Environmental Protection Agency (EPA) he was Principal Science Advisor for Radiation & Hazardous Materials, and managed an extensive risk analysis program.

Dr. Moghissi has held appointments at the University of Maryland, Temple University, Georgia Institute of Technology, and the University of Virginia. His extensive research expe-

rience has dealt with diverse subjects ranging from the measurement of pollutants to the assessment of the biological effects of environmental agents. A major segment and focus of his research are concentrated on regulatory science consisting of scientific information upon which laws, regulations, and judicial decisions are based. Dr. Moghissi has emphasized the need for reliance upon BAS/MESC as the foundation for societal decision-making, and has strongly promoted and advocated the peer review process as the cornerstone of BAS/MESC. He is the author of over 400 publications, including his most recent books *Best Available Science: Metrics for Evaluation of Scientific Claims*, and *Peer Review: Management of Independent peer Review and Scientific Assessment*. Dr. Moghissi is a Fellow of the American Society of Mechanical Engineers.

Dr. Albert J. Valocchi (Lead), (217) 333-3176; valocchi@illinois.edu

Dr. Albert J. Valocchi is Professor at the University of Illinois and Associate Head and Director of Graduate Studies in the Department of Civil and Environmental Engineering. Dr. Valocchi holds a PhD in Civil Engineering (Stanford). His interests are in water resources engineering, groundwater hydrology and contaminant transport, groundwater modeling, and numerical methods. Dr. Valocchi's research focuses upon computational modeling of pollutant fate and transport in porous media, with applications to groundwater contamination, geological sequestration of carbon dioxide, and impacts of model uncertainty on groundwater resources management.

Dr. Valocchi is a Fellow of the American Geophysical Union and editor of the Journal of Contaminant Hydrology. Dr. Valocchi served as Lead of the ASCEM IPRA Team.

IPRA Coordinator

Aníbal L. Taboas, (630) 287-0026; TaboasA2@ASME.org**.** Dr. Aníbal L. Taboas is a Principal Mechanical Engineer at Argonne National Laboratory, and serves as executive consultant on environment, governance, and risk management. His experience includes decades as a federal senior executive in the operation of major research facilities, the nuclear fuel cycle, and environmental remediation. He holds graduate degrees in Physics, Nuclear and Mechanical Engineering, and Environmental Policy (UPAEP), and has a well-established reputation for innovative and interdisciplinary resolution of environmental issues, independent peer review and assessment, regulatory reform, and the use of best available science. He is author of >50 publications ranging from multimedia emissions trading to response to radiological events. Dr. Taboas is a Fellow of the American Society of Mechanical Engineers.

Appendix 3: ASCEM IPRA CHARTER

Advanced Simulation Capability for Environmental Management (ASCEM)

Independent Peer Review and Assessment

CHARTER

Technology Innovation and Development
Office of Environmental Management
U.S. Department of Energy

July 2010

Advanced Simulation Capability for Environmental Management (ASCEM)

Independent Peer Review and Assessment

CHARTER

BACKGROUND and CONTEXT

The US Department of Energy (DOE) office of Environmental Management (EM is addressing one of the largest groundwater and soil contamination problems in the world. EM responsibility includes remediation of 1,800 million cubic meters of groundwater and soil in highly diverse environments, contaminated with radionuclides, metals, and organic contaminants, and with about 95 percent of the remediation effort at large, complex sites.[1] This contamination originated from a number of sources, including intentional surface disposal thought the use of cribs, retention basins, and trenches and from unintended tank waste releases. A number of the released contaminants (e.g. ^{90}Sr, ^{137}Cs, and Pu) have limited mobility in the vadose zone and groundwater. Other contaminants (^{99}Tc, U, and CCl_4) have migrated to regions deep within the vadose zone. In some locations these contaminants have reached the groundwater and are posing a long-term threat. In many cases, limited historical information exists about the magnitude, timing, and content of contaminant releases, requiring estimation of the source terms which adds greater uncertainty to remediation strategies.

A major goal of EM is to move from active remediation to passive remediation followed by long-term monitoring at ~120 waste sites where there is no longer a DOE mission and at ~24 more sites with ongoing mission by 2015. In order to meet this goal, DOE-EM must overcome technology and cost challenges in characterization, remediation, and monitoring of contaminants in the vadose zone[2] and groundwater. Additionally, a combination of limited documentation of contaminant release and lack of understanding of key processes (e.g., biogeochemical and hydrologic) affecting contaminant migration makes it difficult to predict the location, transport, and fate of these contaminants in the subsurface. These factors also make it difficult to design and deploy sustainable remediation approaches and monitor the long-term behavior of remedial actions. Over-coming these limitations requires integrating many efforts to facilitate development of more accurate site models, allow for predictive

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[1] Remediation efforts at Hanford, SRS, Oak Ridge, and Idaho are projected to involve over 400,000 acres.

[2] Valdose zones are unsaturated regions of the subsurface environment above the underlying water table. Contamination is affected by releases from various sources, including from sludge, pond sediments, and storage tanks. Attenuation-based remedies for contamination in groundwater reduce or eliminate migration of contaminants using naturally occurring processes to provide sustainable remediation of the problem. Naturally occurring or enhanced remedies are the only paths to long-term stewardship of sites contaminated with metals and long-lived radionuclides other than very costly physical removal by pump-an-treat methods or excavation, which is impractical in cases of deep vadose zone contamination.

simulation of proposed remediation strategies, and prevent implementation of overly conservative and unnecessarily expensive remediation strategies.

DOE-EM Office of Technology Innovation and Development (OTID), in collaboration with other DOE offices, is developing a transformational, graded, and iterative modeling and simulation approach to meet EM's long-term risk and performance modeling needs. The Advanced Simulation Capability of Environmental Management (ASCEM) program was initiated to support risk and cost reduction efforts across the DOE-EM complex and support strategic OTID groundwater and soils and waste processing initiatives by focusing efforts on the development of a state-of-the-art ***scientific tool and approach*** for understanding and predicting contaminant fate and transport in natural and engineered systems.

The ASCEM modeling imitative, currently in the planning and development stage, will develop an open-source, HPC modeling system for multiphase, multicomponent, multiscale subsurface flow and contaminant transport, and cementitous barrier and source-term degradation. ASCEM leverages and builds upon existing modeling and simulation high-performance computing technologies, and valuable lessons learned from related system performance assessments developed in support of other DOE activities (particularly in relation to environmental compliance and licensing, such as in Nuclear and Fossil Energy, Radioactive Waste Disposal, and Environmental Sustainability). The ASCEM modeling tools will incorporate capabilities for predicting releases from various waste forms, identifying exposure pathways and performing dose calculations, and conducting systematic uncertainty quantification. ASCEM will demonstrate the modeling tools on selected sites and apply them in support of the next generation of performance assessments of nuclear waste disposal and decommissioning of facilities across the EM complex.

There is insufficient technical information to conduct a detailed technical peer review of the entire ASCEM activity at this time, although such a review is envisioned to follow in due course. The *"ASCEM FY10-FY15 Integrated Modeling Implementation Plan"* is the subject of this Independent Peer Review and Assessment (IPRA). This CHARTER authorizes the designated IPRA Coordinator to direct all aspects of executing the subject IPRA.

SCOPE AND SCHEUDLE

This IPRA focuses on the planning and development stage of the ASCEM effort, particularly, the *"ASCEM FY10-FY15 Integrated Modeling Implementation Plan."* This plan also serves as an update to the *FY2010 Initiative Implementation Plan*. It describes the multi-year (FY11 to FY15) effort and the synergistic relationships among the OTID offices' data collection and modeling efforts. This document summarizes how ASCEM will integrate and leverage the research and technology development efforts occurring in other programmatic areas within DOE-EM OTID and the other DOE offices to produce a transformational, graded, and iterative modeling and simulation approach to meet EM's long-term risk and performance modeling needs.

The IPRA format includes

- ✓ Individual pre-IPRA document review
- ✓ Program presentations and IPRA Team interaction with planners

- ✓ Review and assessment of the DRAFT implementation plan
- ✓ Report preparation, documenting findings and observations, and
- ✓ Factual accuracy review, editing, and issuance of letter report

Program staff from the EM Office of Technology Innovation and Development (EM-30) will deliver the following background information in electronic format to the IPRA Coordinator by July 20, 2010:

1. Overview of the EM Groundwater and Soil Remediation Program, A Power Point Briefing by Dr. Triay (December 7, 2009)
2. Scientific Opportunities to Reduce Risk in Groundwater and Soil Remediation, PNNL Report 18516 (August 2009)
3. Advice on the Department of Energy's Cleanup Technology Roadmap: Gaps and Bridges, National Academies of Science (2009)
4. ASCEM Integrated Modeling Implementation Plan (in preparation)
5. FY10 ASCEM Implementation Plan
6. ASCEM Charter

The execution schedule supports a programmatic commitment requiring issuance of a final report on or by September 2010, including designation and securing of IPRA team membership by July 20, 2010; and conducting a 2-3 day IPRA Team meeting in Washington, DC, by August 15, 2010. Such meeting is tentatively planned for the week of August 9, 2010 in FRSTL.

RESOURCES

The Acting Director, Office of Groundwater & Soil Remediation (EM-32) is Kurt Gerdes. Available support includes EM-32 ASCEM Program Manager, Mark Williamson, Multi-laboratory ASCEM Program Manager Paul Dixon (LANL), and others as required. It is likely that organization involved in ASCEM action areas will also participate.

EM will support logistics, including background information material, conference room (FRSTL), briefings, and other support as appropriate. Limited support service resources have been earmarked.

LINES OF INQUIRY

The lines of Inquiry serves as a general guide for exploration by the IPRA Team. In reviewing and assessing the overall management implementation plan for a system aimed at increased modeling capability, and whose effectiveness is measured by the extent of increased regulatory, scientific, and public acceptance, the most relevant question is: Does the strategy make sense, and is it reasonable for EM implementation? Relevant inquiries include:

- Is there a clear program need? Does ASCEM answer an appropriate applied R&D need? Does the plan provide a credible path to address the relevant program gaps identified

by the National Academy of Sciences?

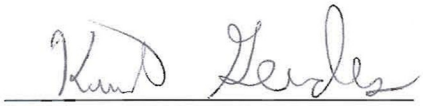
- Does planning appropriately address identification of available strategies and tools, and how to evaluate their usefulness?
- Does the planning properly align with integrating scientific findings and computational advances for the next generation performance assessment?
- Does the plan outline the ability to integrate and leverage the research and technology development efforts occurring in other programmatic areas within DOE-EM OTID and the other DOE offices to produce a transformational, graded, and iterative modeling and simulation approach to meet EM's long-term risk and performance modeling needs?
- Is there appropriate weight given to systematically addressing uncertainty, analysis techniques, and parameter estimation methods for conceptual multimedia environmental models?
- Are the scope, purpose, goals, and customers clearly identified and understood? Does the structure support effective implementation? Is it reasonably likely to deliver the desired product? How likely is public and regulatory buy-in?
- Have realistic resources been identified? Is there appropriate organizational commitment?

MEMBERSHIP

The value of IPRA is largely dependent on the qualifications of the reviewers, including education, experience, peer recognition, contributions to the profession, and other parameters that constitute exceptional scientific and technical expertise. The IPRA Coordinator is an external advisor to EM, who has no line responsibility for EM program execution, and who manages overall IPRA resources and process.

The IPRA Coordinator seeks input for potential reviewers from various sources, including the EM External Experts Group, and independently weighs relevant factors in identifying, selection, and recruiting the actual members of the IPRA Team. The review team will consist of distinguished individual experts in their field that are appropriately independent of the EM ASCEM activity, and otherwise not currently being funded by EM. The IPRA Coordinator is Aníbal Taboas (ANL), who will be supported in this IPRA by Paula Kirk (EM-44).

Concurred by:



July 8, 2010

Kurt Gerdes, Acting Director
Office of Groundwater & Soil Remediation (EM-32)

Approved:

July 8, 2010

Yvette T. Collazo, Director
Office of Technology Development and Innovation (EM-30)

Appendix 4: CONFLICT OF INTEREST FORM

Independent Peer Review and Assessment (IPRA)

Conflict-of-Interests and Confidentiality Statement

Advanced Simulation Capability for Environmental Management (ASCEM)

Your Potential Conflicts of Interests: Designation as prospective IPRA Team Member requires that you be aware and avoid potential conflict situations that may arise. The IPRA Team will be asked to review specific program activities. You might have a conflict with one or more. Should any conflict arise, you must bring the matter to the attention of the IPRA Coordinator, who will determine how the matter should be handled and will tell you what further steps, if any, to take. Examples of potentially biasing affiliations or relationships include:

- AFFILIATION WITH AN ASCEM PARTICIPATING INSTITUTION; if you have/hold/are: current employment, including consulting or an advisory arrangement; previous employment within the last year; any office, governing board membership, or relevant committee chairpersonship in the institution.
- RELATIONSHIP WITH AN INVESTIGATOR OR OTHER PERSON WHO HAS A PERSONAL INTEREST IN ASCEM and/or RELATED APPLICATION; if you have/hold/are: family, business, or professional partnership (e.g.; association as thesis advisor/student); collaboration, within the last 2 yr., on a project or on a book, article, report, or paper; or co-editing within the last 2 yr., of a journal, compendium, or conference proceedings.
- OTHER AFFILIATIONS OR RELATIONSHIPS; interests, affiliation, or relationship of the following are treated as if they were yours: your spouse, your minor child, of a relative living in your immediate household or of anyone who is legally your partner; and other relationship, such as close personal friendship, that might tend to affect your judgment or be seen as doing so by a reasonable person familiar with the relationship

Sponsorship outside of the Environmental Management Program of the US Department of Energy (DOE), and involvement in related environmental modeling external to ASCEM, are not disqualifying conflicts for this IPRA.

No Use of "Insider" Information: If designation gives you access to information not generally available to the public, you must not use that information for your personal benefit or make it available for the benefit of any other individual or organization. This is distinguished from the entirely appropriate benefit of learning more about the program being reviewed, learning from other panel members, or becoming better acquainted with the state of a given discipline.

Your Obligation to Maintain Confidentiality: You must not copy, quote, or otherwise use or disclose to anyone, including students and associates, any material that you are asked to review. If you believe a colleague can make a substantial contribution to the review, obtain advance approval through the IPRA Coordinator.

Confidentiality of the Review Process: While DOE may disclose your identity as a reviewer, the confidentiality of all discussions and of other reviewers must be respected. Do not disclose their identities, the relative assessments and observations, or other details about the peer review and assessment.

Qualifications: The value of IPRA is largely dependent on the qualifications of the reviewers, including education, experience, peer recognition, contributions to the profession, and other parameters that constitute exceptional independent scientific and technical expertise. This is established by self-disclosure and other sources.

CERTIFICATION

To the best of my knowledge, I have no affiliation, relationship, conflict, or foreseen practical limitations, which would prevent me from performing my IPRA duties. I consent to disclosure of my identity as individual reviewer, including related background information, and of the overall team conclusions. I will contact the IPRA Coordinator if a conflict exists or arises during my service.

Name: _____ Signature: _____ Date: _____, 2010